mortar-pans (which are driven by steam power). The mortar is used fresh, generally on the day it is made. It sets rapidly, and in a few months the rubble becomes one solid mass. Grout is used plentifully, made from the same mortar.

ARTISTICAL INSTITUTIONS AT MANCHESTER.

On Monday in last week the second social meeting of the pupils and friends of the School of Design was held—chairman, Mr. Bazley, who, in his address, remarked that only a few days ago, in the Town-hall, a distinguished stranger, the minister from the United States, observed that, in taste, he believed England would prove herself inferior to the nations of Europe, and especially to France, Germany, and probably Switzerland, at the great exhibition of 1851. It was very gratifying that in Manchester they had, as it were, the nucleus of a most important school, from which an improvement in public taste might be expected to arise; but the teaching, in his opinion, ought to extend to the people without the walls of the school: for, unless there were an appreciation of high art and of refined taste among the people at large, they would only be "casting their pearls before swine." Mr. Brotherton, M.P., Mr. Hammersley, the head master, Mr. Cobden, M.P., the Mayor, and Mr. Letherbrow, one of the students, also addressed the meeting, which was well attended by ladies as well as gentlemen. Mr. Cobden said that he did not think it would require more than a half-penny in the pound in Manchester to raise a sum of 2,000*l.* a year. The assessment, he thought, was nearly 1,000,000*l.* a year. [The Mayor said it was 1,200,000*l.*] Well, that was 2,500*l.* a year; and taking Salford into partnership, they might, he believed, by this half-penny rate get upwards of 3,000*l.*; which would not only support a school of design, but a museum also.——The annual Christmas party of the Mechanics' Institution drawing classes was held on Thursday evening in last week, when about fifty of the male and female pupils met for social recreation and amusement. The walls of the room were crowded with several hundred specimens of drawings, in oil, water-colour, and chalk, mechanical drawings, artistic designs, &c. The pictures displayed every possible stage of artistic progress, for all the specimens sent were admitted. The two drawing classes, according to the *Manchester Spectator*, at present number about 140 pupils.——The social soirée of the Athenæum, too, has just been held. Mr. Cobden presided. The assemblage of ladies and gentlemen was a numerous one. The chairman said that the number of members had, he believed, increased from fifteen to twenty during the last year. He thought the number of the members of this institution was not so great as it ought to be in Manchester. He did not think they had more than 250 or 300 members under twenty-one years of age, and probably the majority were upwards of forty. He exhorted young men of twenty to twenty-five to prize such an institution a great deal more than they seemed to do. A dramatic and musical entertainment followed the address.

Books.

The Elements of Descriptive Geometry: being the First Part of a Treatise on Descriptive Geometry, and its Application to Shipbuilding. By Joseph Woolley, M.A., LL.D. London: John W. Parker. 1850.

If we were to set before our readers a simple statement of the enormous sums of money which have been wasted in our shipbuilding departments *through ignorance*, they would be startled, and would admit the necessity of efforts to supply knowledge to those who pursue this branch of construction. Dr. Woolley's work is arranged with this end in view, and has been published by direction of the Lords of the Admiralty. The writer observes, in his preface, that "The scarcity of works on this subject in the English language has encouraged the author to hope [he should say, leads the author to *fear*] that much of the contents of the present volume will be new to the English student; that not only the naval architect and engineer (who is especially interested in this branch of mathematics) will find it of use, but also students in the universities, to whom the principles of the geometry of space are usually accessible only in an analytical form, will find this subject rendered much more distinct and clear when seen by the light which the more palpable methods of descriptive geometry enable us to throw upon it."

The book is the work of one who is master of the subject, but is scarcely adapted for minds which approach the subject for the first time,—the previous study of some more elementary "Elements" will lighten the effort. A valuable atlas of diagrams accompanies the volume, and will be found valuable, beyond assisting the student in comprehending the problems solved, as an introduction to the theory of laying off ships on the mould-loft floor,—a subject that is to be fully treated of in the second part of the work.

A Progressive Course of Inventive Drawing, on the Principles of Pestalozzi. By Hermann Krüsi and W. J. Whitaker. Ramsay, Brompton-row, 1850.

This little volume is addressed by the authors especially to teachers, with the view of assisting them to develope a power of design. The means adopted are, making the children produce a graduated series of figures of their own creation. The children being taught a few geometrical forms are made to combine them according to their own fancy. "Childhood is the age when the power of combination is most active. To direct its operations in systematic progression leads to their application to inventive art, and prepares the ground for original conception in the higher regions of the arts." The idea is a good one, but practice in copying forms set before them must be superadded.

The British Almanac and Companion for 1851. London: C. Knight.

The general information given in the present issue of this very excellent and now well-known publication includes papers on Some Points in the History of Arithmetic; Railways of the United Kingdom; Supply of Cotton; and Industrial Associations. From the second named of these we find the following concise note of

"*The Tyne and Tweed Railway Bridges.*—So important are the means by which the east coast railways have been enabled to span the valleys of the Tyne and the Tweed, and so beautiful are the viaducts at these spots as works of engineering skill, that they call for a little separate description.

When the Newcastle and Berwick Railway was planned, it was felt that a junction with the Newcastle and Darlington line could be effected only by the construction of a very lofty bridge over the Tyne at Newcastle; because the banks of the river at that spot are very steep, and the general level of the railways would not permit of a crossing at a relatively small height above the water. It had long been wished by the inhabitants to have a "high-level" bridge, since the old bridge was adapted only for the low or water-side districts of Newcastle and Gateshead; and Mr. Robert Stephenson boldly planned a scheme which should meet this requirement, as well as the requirement of the railway companies. He drew up the scheme for a *double* bridge, with a railway line over a common road; the companies assented, an Act was obtained, and the works are now nearly, if not quite, finished.

In order to understand the arrangement of this bridge, we must briefly notice the course of the railways through Newcastle. The Newcastle and Carlisle Railway had, till lately, its terminus at the western margin of Newcastle; the Newcastle and North Shields had its terminus in Pilgrim-street, near the eastern suburbs; the Newcastle and Berwick started from the last-named railway, at a point beyond the limits of the town; and the Newcastle and Darlington terminated at Gateshead, on the south bank of the Tyne. It was deemed advisable to merge all these termini in a new station on a magnificent scale, built in the heart of the town. This fine structure was illustrated and described in the *Companion* for 1850, p. 247. The Carlisle line has been extended beyond its former terminus, and carried on a bold curve to the central station; the Shields line (and consequently the Berwick line which runs into it) has been carried at a great height over Pilgrim-street and Dean-street, to the central station; while the Darlington line, shooting past its former terminus at Gateshead, is brought to the central station by the magnificent bridge now under notice.

The Tyne bridge has two piers at the margin of the river, and four others in the stream itself, besides minor piers to support the land arches. These piers are of massive masonry. The distance from pier to pier is about 124 feet, and this determines the span of the arches. At a height of about 90 feet above the level of high water runs a level bridge for carriages, horses, and pedestrians; and at a further height of about 25 feet above this roadway runs the railway itself. The entire height of the masonry and iron work, from the bed of the river to the parapet of the railway, exceeds 130 feet. The whole length of the structure, from the high ground of Gateshead to the high ground of Newcastle, is nearly 1,400 feet. There are nearly 5,000 tons of iron-work in the structure. The masonry in and over the river has cost more than 100,000*l.*; the masonry and brickwork in fixing the land arches, about an equal sum; while the iron-work has cost a still larger sum.

The Tweed bridge has been opened for traffic in the autumn of 1850, on the occasion of her Majesty's journey to Scotland. It is one of the finest and largest railway viaducts ever constructed. The old bridge over the Tweed was built in the reigns of James I. and Charles I.; it is nearly 1,000 feet in length, and consists of fifteen arches. When a junction became desirable between the North British and the various English railways, a viaduct over the Tweed was necessary; and Mr. Robert Stephenson planned the structure which has been lately opened. In order that the traffic might be accommodated, a temporary timber viaduct was built, to be used while the permanent viaduct was being constructed. This timber viaduct was itself a clever and even elegant structure; it was 1,200 feet in length, and contained nearly 300,000 cubic feet of timber. The permanent stone viaduct consists of twenty-eight circular arches, each 61½ feet span, springing from lofty piers 8½ feet broad. The total length is 2,160 feet; and the greatest height, from the bed of the river to the parapet, is 126½ feet. One-half of the length is over the river; the other half is over the low shore on the south bank. The breadth between the parapets is 24 feet. The land portion of the viaduct has a graceful curve towards the east, on a half-mile radius. The roadway is on an incline, ascending towards Berwick. There are 1,250,000 cubic feet of masonry, and 2,500,000 bricks. Southward of the viaduct there is an embankment more than half a mile in length, in some places 60 feet high, and containing 700,000 cubic yards of earthwork; so that the entire lofty structure to connect the English with the Scotch railway is very little short of a mile in length. The cost of the viaduct has been about 200,000*l.*"

In the paper on "Industrial Associations," it is urged "that under a law of partnership with limited liability—under a law in which the principal of a concern would not incur risk in assigning small shares to his assistants—a more harmonious arrangement of interests and duties might be effected than we now can hope to effect, and the talents and industrial virtues of the employed more extensively called forth."

From the chapter on "Public Improvements," we take the writer's view of

The Question of Copyism.

"In the table of places where new churches are building, besides a column stating the date when each was begun, and another, that on which it is expected to be finished, we have a third, devoted to the "style and character," i. e., the date represented, whether in the 13th, 14th, or 15th century. Thus we find

Place.	*Style and Character.*	*First Stone laid.*
Stockport, district of Portwood.	Perpendicular, about 1420.	23 Aug. 1849.

and so on through the schedule. Now a plain man naturally asks, was this, then, the practice of those you profess to imitate? Did the designers, in the three centuries of "Christian Art" itself, take a review of some bygone system of art, then *choose their period* and adhere

For a comprehensive guide on OCR and PDF Compression visit our website